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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/708,932	11/08/2000	Salman Akram	3434.IUS (97-856.1)	4170

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EXAMINER

MACKEY, JAMES P

ART UNIT	PAPER NUMBER
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1722

DATE MAILED: 01/02/2003

9

Please find below and/or attached an Office communication concerning this application or proceeding.

DL9

Office Action Summary

Application No.

09/708,932

Applicant(s)

AKRAM, SALMAN

Examiner

James Mackey

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 October 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 and 39-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-37 and 39-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Art Unit: 1722

1. The corrected or substitute formal drawings were received on 15 October 2002. These drawings are acceptable.
2. Claims 4, 5, 21, 22, 32 and 33 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claims 4, 5, 21, 22, 32 and 33 only recite the functioning of the claimed apparatus during its intended operation, and the contents of the claimed apparatus during its intended operation; such does not set forth additional structure of the claimed apparatus and relates only to the intended use of the claimed apparatus, which does not patentably distinguish the claimed apparatus structure, and therefore does not further limit the subject matter of the apparatus claims. Note that the recitation in amended claims 4, 21 and 32 that "said nonstick protective layer comprises means for preventing a metal material from adhering" does not recite additional structure for the claimed mold apparatus because the nonstick protective layer **is the only** means for preventing metal material from adhering. Also note that the claim recitation in claims 5, 22 and 33 regarding the particular metal material being molded in the mold apparatus does not structurally distinguish the claimed mold apparatus. Note that intended use has been continuously held not to be germane to determining the patentability of the apparatus, *In re Finsterwalder*, 168 USPQ 530. The manner or method in which a machine is to be utilized is not germane to the issue of patentability of the machine itself, *In re Casey*, 152 USPQ 235. Purpose to which apparatus is to be put and expression relating apparatus to contents thereof during

Art Unit: 1722

intended operation are not significant in determining patentability of an apparatus claim, *Ex parte Thibault*, 164 USPQ 666.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 4, 5, 21, 22, 32 and 33 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The original specification does not describe that the nonstick protective layer includes any “means for preventing a metal material from adhering”, other than the nonstick protective layer itself. Note that claims 5, 22 and 33 are rejected due to their dependence on claims 4, 21 and 32 which include the above recitation.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-5, 16, 18-24, 27, 29-33, 37 and 41 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Ochiai et al. (U.S. Patent 5,643,831; col. 4, lines 57-60, and col. 6, lines 16-17). Note that the solder paste filled into the cavities 12 of mold 10 completely fills the mold cavities, such that the molded solder bumps are of the same dimensions as the mold cavities, notwithstanding the disclosure of Ochiai et al. that the molded solder bumps are intended to be

Art Unit: 1722

heated to reflow the solder to subsequently form solder balls 20. A recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations, *Ex parte Masham*, 2 USPQ2d 1647. Also note that Ochiai et al. clearly teach that the mold substrate plate is heated (col. 4, line 66), inherently teaching a heating element (claim 24) to accomplish such a heating function.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 6-11, 17, 25, 26, 28 and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai et al. (U.S. Patent 5,643,831).

Ochiai et al. '831 teaches the mold apparatus substantially as claimed, except for the cavity depth being "about 28 micrometers" (claims 6, 25, 34), except for the protective layer thickness being "from about 200 Angstroms to 5 micrometers" (claims 7, 26, 35), except for the particular shape of the cavity (claims 8-11, 36), and except for the mold substrate comprising ceramic material (claims 17 and 28).

However, Ochiai et al. '831 explicitly discloses cavity depths of 70 to 100 micrometers (col. 6, line 62), and further discloses the relationship between cavity depth and the length of the side of the cavity mouth (col. 6, lines 63-67), including graphically correlating the side length to cavity depths of between 0-100 micrometers (as clearly shown in Figure 13), and Ochiai et al. also discloses the utility of forming solder bumps having a thickness of "several tens of m" (col.

Art Unit: 1722

2, lines 38-39); therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ochiai et al. by providing a cavity depth of about 28 μ m, since Ochiai et al. recognize the utility of solder bump products of similar thickness, and since Ochiai et al. disclose side lengths of the cavity mouth for a range of cavity depth which clearly overlaps the claimed cavity depth (see Figure 13).

Additionally, Ochiai et al. '831 (Figures 2-3) shows a protective layer thickness approximately corresponding to the upper end of the claimed thickness range. Therefore, it would have been obvious to a skilled artisan to have provided the silicon mold substrate with a silicon oxide or silicon nitride protective layer by oxidizing or nitriding the silicon mold substrate to a protective layer thickness within the claimed range in order to inexpensively produce the protective layer and to minimize altering the cavity shape/depth by the protective layer.

With regard to the shape of the cavity, trapezoidal, hemispherical, square and rectangular shaped cavities are conventional in the molding art for mold cavities for producing solder balls, and therefore it would have been obvious and well within the level of ordinary skill in the art to have provided the wedge-shaped, rhomboid-mouthed cavity of Ochiai et al. '831 in such conventional shapes, since each of the cavity shapes has recognized utility for forming solder balls. Furthermore, mold substrates formed of ceramic material are also conventional in the molding art for mold substrates for producing solder balls, and therefore it would have been obvious and well within the level of ordinary skill in the art to have provided the mold substrate of Ochiai et al. '831 of a ceramic material, since such is a recognized equivalent to silicon for use as a mold substrate for producing solder balls.

9. Claims 12-15, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochiai et al. (U.S. Patent 5,643,831) in view of Bolstad (U.S. Patent 2,979,773; column 2, lines 5-14).

Ochiai et al. '831 teaches the mold apparatus substantially as claimed, including disclosing that the mold substrate plate is heated (col. 4, line 66), except for disclosing a heater strip or plural heater strips located on another surface of the mold substrate. Bolstad discloses heater strips for efficiently providing heat to a semiconductor mold material 22. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ochiai et al. by providing heater strips on the exterior of the mold substrate, as suggested by Bolstad, in order to efficiently provide heat to the mold substrate plate as desired by Ochiai et al.

10. Applicant's arguments filed Oct. 15, 2002, have been fully considered but they are not persuasive.

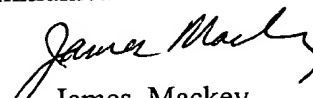
Applicant argues that Ochiai et al. do not disclose a mold apparatus that includes a "cavity having substantially the same dimensions as the at least one metal bump" formed in the mold apparatus; however, Ochiai et al. disclose that the solder paste filled into the cavities 12 of mold 10 completely fills the mold cavities, such that the molded solder bumps are of the same dimensions as the mold cavities, notwithstanding the disclosure of Ochiai et al. that the molded solder bumps are intended to be heated to reflow the solder to subsequently form solder balls 20. A recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations, *Ex parte Masham*, 2 USPQ2d 1647.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Mackey whose telephone number is 703-308-1195. The examiner can normally be reached on M-F, 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jan Silbaugh can be reached on 703-308-3829. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.


James Mackey
Primary Examiner
Art Unit 1722

12/30/02

jpm
December 30, 2002